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DEEP LEARNING BASED SPACECRAFT ATTITUDE DETERMINATION AND CONTROL SYSTEM

Abstract

The Attitude Determination and Control System (ADCS) is crucial for stabilizing the satellite in orbit and is responsible in ensuring that it points in the right direction. The design was considered because traditional ADCS did not adapt to the changing environment in space leading to lower accuracy. To mitigate this, a new ADCS system based on deep learning model was developed which resulted in improved accuracy and robustness across environments. Traditionally for ADCS system attitude is determined using control algorithms with direction measurement. And then the error and error rate between the estimated and desired state is computed. Here we propose deep learning models which can estimate the attitude based on the environment conditions and other factors. The deep learning model then computes the required torques to be applied. This entire system helps the ADCS system to be more robust under external factors and conditions. The advantages of such a system will be less computational load on the satellite, the models can be trained online i.e can adapt to different conditions and can be customized to changing spacecraft configuration. This also gives a flexibility of mapping multitude of parameters. The model can be generalized across different space system making it easier to deploy on different spacecraft configuration.